

# SEQUENCE LISTING

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DEAVOURS, BETTINA

<120> METHODS AND COMPOSITIONS FOR PRODUCTION OF FLAVONOID  
AND ISOFLAVONOID NUTRACEUTICALS

<130> NBLE:007US

<140> UNKNOWN

<141> 2003-09-10

<150> 60/409,447

<151> 2002-09-10

<160> 14

<170> PatentIn Ver. 2.1

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<212> PRT

<213> Soybean

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Pro Asn Pro Pro Ser Pro Lys Pro Arg Leu Pro Phe Ile Gly His Leu  
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His Leu Leu Lys Asp Lys Leu Leu His Tyr Ala Leu Ile Asp Leu Ser  
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Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met Pro Thr  
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Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln Thr His  
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Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile Arg Arg  
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Leu Thr Tyr Asp Ser Ser Val Ala Met Val Pro Phe Gly Pro Tyr Trp  
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Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Pro Asn Ala Thr Thr  
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Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Thr Arg Lys Phe Leu  
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Arg Val Met Ala Gln Gly Ala Glu Ala Gln Lys Pro Leu Asp Leu Thr  
165 170 175

Glu Glu Leu Leu Lys Trp Thr Asn Ser Thr Ile Ser Met Met Met Leu  
180 185 190

Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile  
195 200 205

Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys His Leu  
210 215 220

Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe  
225 230 235 240

Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val Arg  
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Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Val Ser Gly Val Phe  
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 Pro Tyr Ile Arg Ala Ile Val Lys Glu Thr Phe Arg Met His Pro Pro  
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 Ile Leu Lys Gly Gly Asp Ala Lys Val Ser Met Glu Glu Arg Ala Gly  
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<213> Medicago sativa

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<400> 3

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Thr Ala Ile Thr Val Glu Asn Leu Glu Tyr Pro Ala Val Val Thr Ser
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ccg gtc acc ggc aaa tca tat ttc ctc ggt ggc gct ggg gag aga gga 151
Pro Val Thr Gly Lys Ser Tyr Phe Leu Gly Gly Ala Gly Glu Arg Gly
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Leu Thr Ile Glu Gly Asn Phe Ile Lys Phe Thr Ala Ile Gly Val Tyr
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ttg gaa gat ata gca gtg gct tca cta gct gcc aaa tgg aag ggt aaa 247
Leu Glu Asp Ile Ala Val Ala Ser Leu Ala Ala Lys Trp Lys Gly Lys
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tca tct gaa gag tta ctt gag acc ctt gac ttt tac aga gac atc atc 295
Ser Ser Glu Glu Leu Leu Glu Thr Leu Asp Phe Tyr Arg Asp Ile Ile
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Ser Gly Pro Phe Glu Lys Leu Ile Arg Gly Ser Lys Ile Arg Glu Leu
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Ser Gly Pro Glu Tyr Ser Arg Lys Val Met Glu Asn Cys Val Ala His
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Lys Phe Ala Glu Ala Phe Lys Pro Val Asn Phe Pro Pro Gly Ala Ser
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           215                          220

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Leu	Ile	Glu	Asn	Lys	Ala	Val	Ser	Ser	Ala	Val	Leu	Glu	Thr	Met	Ile
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Gly	Glu	His	Ala	Val	Ser	Pro	Asp	Leu	Lys	Arg	Cys	Leu	Ala	Ala	Arg
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ggt cct gca acc att ttg gcc att ggc act gca aat cca gca aat tgt 156
Gly Pro Ala Thr Ile Leu Ala Ile Gly Thr Ala Asn Pro Ala Asn Cys
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ggt gaa caa agt aca tat cct gat ttt tac ttt aaa atc aca aat agc 204
Val Glu Gln Ser Thr Tyr Pro Asp Phe Tyr Phe Lys Ile Thr Asn Ser
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Ser Met Ile Lys Arg Arg Tyr Met Tyr Leu Thr Glu Glu Ile Leu Lys
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Glu Asn Pro Ser Val Cys Glu Tyr Met Ala Pro Ser Leu Asp Ala Arg
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tta att gtt tgc act aca agt ggt gta gac atg cct gga gct gat tac	Leu Ile Val Cys Thr Thr Ser Gly Val Asp Met Pro Gly Ala Asp Tyr			492
	130	135	140	
caa ctc aca aaa ctc ttg ggt ctt cgc cca tat gtg aaa agg tat atg	Gln Leu Thr Lys Leu Leu Gly Leu Arg Pro Tyr Val Lys Arg Tyr Met			540
	145	150	155	
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aaa gat ttg gct gag aac aac aaa ggt gcc cgt gta ttg gtt gtt tgt	Lys Asp Leu Ala Glu Asn Asn Lys Gly Ala Arg Val Leu Val Val Cys			636
	175	180	185	190
tct gaa gtc act gca gtc aca ttc cgc ggc cct agt gat act cac ttg	Ser Glu Val Thr Ala Val Thr Phe Arg Gly Pro Ser Asp Thr His Leu			684
	195	200	205	
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	210	215	220	
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	225	230	235	
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	240	245	250	
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gtt cct ggg att gtt tca aag aac att gat aaa gca tta gtt gaa gct	Val Pro Gly Ile Val Ser Lys Asn Ile Asp Lys Ala Leu Val Glu Ala			924
	275	280	285	
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	290	295	300	
cac cct ggt ggc cct gca att tta gat caa gta gag caa aag tta gcc	His Pro Gly Gly Pro Ala Ile Leu Asp Gln Val Glu Gln Lys Leu Ala			1020
	305	310	315	
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	320	325	330	

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aag aaa tca act caa gat gga ctg aag aca aca gga gaa gga ctt gaa 1164  
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tgg ggt gtg tta ttt ggc ttt gga cca gga ctt acc ata gaa act gtt 1212  
 Trp Gly Val Leu Phe Gly Phe Gly Pro Gly Leu Thr Ile Glu Thr Val  
 370 375 380

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 Val Leu Arg Ser Val Ala Ile  
 385 390

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<211> 389

<212> PRT

<213> Medicago sativa

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 Lys Thr Glu Leu Lys Glu Lys Phe Gln Arg Met Cys Asp Lys Ser Met  
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 210 215 220  
 Gly Ser Asp Pro Val Pro Glu Ile Glu Lys Pro Ile Phe Glu Met Val





Tyr	Met	Tyr	Leu	Thr	Glu	Glu	Ile	Leu	Lys	Glu	Asn	Pro	Ser	Val	Cys	
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Trp	Gly	Gln	Pro	Lys	Ser	Lys	Ile	Thr	His	Leu	Ile	Phe	Cys	Thr	Thr	
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Asn	Lys	Gly	Ala	Arg	Val	Leu	Val	Val	Cys	Ser	Glu	Val	Thr	Ala	Val	
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Thr	Phe	Arg	Gly	Pro	Ser	Asp	Thr	His	Leu	Asp	Ser	Leu	Val	Gly	Gln	
			200					205					210			
gca	ctc	ttt	gga	gat	ggc	gct	gct	gca	ctc	att	gtt	ggc	tct	gac	cca	789
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Ile	Pro	Glu	Ile	Glu	Lys	Pro	Ile	Phe	Glu	Met	Val	Trp	Thr	Ala	Gln	
	230					235					240					
aca	att	gct	cca	gac	agt	gaa	gga	gcc	att	gat	ggc	cac	ctt	gtc	gaa	885
Thr	Ile	Ala	Pro	Asp	Ser	Glu	Gly	Ala	Ile	Asp	Gly	His	Leu	Val	Glu	
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Ala	Gly	Leu	Thr	Phe	His	Leu	Leu	Lys	Asp	Val	Pro	Gly	Ile	Val	Ser	
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aag	aac	att	gat	aaa	gca	ttg	att	gag	gct	ttc	caa	cca	tta	aac	atc	981
Lys	Asn	Ile	Asp	Lys	Ala	Leu	Ile	Glu	Ala	Phe	Gln	Pro	Leu	Asn	Ile	
			280					285					290			
tct	gat	tac	aat	tca	atc	ttc	tgg	att	gct	cac	cca	ggc	gga	ccc	gca	1029
Ser	Asp	Tyr	Asn	Ser	Ile	Phe	Trp	Ile	Ala	His	Pro	Gly	Gly	Pro	Ala	

295	300	305	
att cta gac caa gtt gaa gaa aag tta ggc tta aaa cct gaa aag atg			1077
Ile Leu Asp Gln Val Glu Glu Lys Leu Gly Leu Lys Pro Glu Lys Met			
310	315	320	
aag gcc act agg gaa gta ctt agt gaa tat ggt aac atg tca agt gca			1125
Lys Ala Thr Arg Glu Val Leu Ser Glu Tyr Gly Asn Met Ser Ser Ala			
325	330	335	340
tgt gta ttg ttc atc tta gat gag atg aga aag aaa tcg gca caa gcg			1173
Cys Val Leu Phe Ile Leu Asp Glu Met Arg Lys Lys Ser Ala Gln Ala			
	345	350	355
gga ctt aaa acc aca gga gaa ggc ctt gac tgg ggt gtg ttg ttt ggc			1221
Gly Leu Lys Thr Thr Gly Glu Gly Leu Asp Trp Gly Val Leu Phe Gly			
	360	365	370
ttc gga cct gga ctt acc att gaa acc gtt gtt ctc cat agc gtg gct			1269
Phe Gly Pro Gly Leu Thr Ile Glu Thr Val Val Leu His Ser Val Ala			
	375	380	385
ata tga aatgattgat tgttttattt tattgtatta cttttaaaact tgcttgaaat			1325
Ile			
390			
tccatgtaag aataaataca gagttcatgt accatggatg ttaaaacgaa tataccattt			1385
gtagcttctt ctttttctcg caaaaaaaaa aggaattc			1423

<210> 9  
 <211> 389  
 <212> PRT  
 <213> Medicago sativa

<400> 9

Met Val Ser Val Ser Glu Ile Arg Gln Ala Gln Arg Ala Glu Gly Pro			
1	5	10	15
Ala Thr Ile Met Ala Ile Gly Thr Ala Asn Pro Ser Asn Cys Val Glu			
	20	25	30
Gln Ser Thr Tyr Pro Asp Phe Tyr Phe Lys Ile Thr Asn Ser Glu His			
	35	40	45
Lys Val Glu Leu Lys Glu Lys Phe Gln Arg Met Cys Asp Lys Ser Met			
	50	55	60
Ile Lys Arg Arg Tyr Met Tyr Leu Thr Glu Glu Ile Leu Lys Glu Asn			
	65	70	75
Pro Ser Val Cys Glu Tyr Met Ala Pro Ser Leu Asp Ala Arg Gln Asp			
	85	90	95
Met Val Val Val Glu Val Pro Arg Leu Gly Lys Glu Ala Ala Val Lys			
	100	105	110
Ala Ile Lys Glu Trp Gly Gln Pro Lys Ser Lys Ile Thr His Leu Ile			
	115	120	125
Phe Cys Thr Thr Ser Gly Val Asp Met Pro Gly Ala Asp Tyr Gln Leu			
	130	135	140
Thr Lys Leu Leu Gly Leu Arg Pro Tyr Val Lys Arg Tyr Met Met Tyr			
	145	150	155
			160

Gln Gln Gly Cys Phe Ala Gly Gly Thr Val Leu Arg Leu Ala Lys Asp  
 165 170 175  
 Leu Ala Glu Asn Asn Lys Gly Ala Arg Val Leu Val Val Cys Ser Glu  
 180 185 190  
 Val Thr Ala Val Thr Phe Arg Gly Pro Ser Asp Thr His Leu Asp Ser  
 195 200 205  
 Leu Val Gly Gln Ala Leu Phe Gly Asp Gly Ala Ala Leu Ile Val  
 210 215 220  
 Gly Ser Asp Pro Ile Pro Glu Ile Glu Lys Pro Ile Phe Glu Met Val  
 225 230 235 240  
 Trp Thr Ala Gln Thr Ile Ala Pro Asp Ser Glu Gly Ala Ile Asp Gly  
 245 250 255  
 His Leu Val Glu Ala Gly Leu Thr Phe His Leu Leu Lys Asp Val Pro  
 260 265 270  
 Gly Ile Val Ser Lys Asn Ile Asp Lys Ala Leu Ile Glu Ala Phe Gln  
 275 280 285  
 Pro Leu Asn Ile Ser Asp Tyr Asn Ser Ile Phe Trp Ile Ala His Pro  
 290 295 300  
 Gly Gly Pro Ala Ile Leu Asp Gln Val Glu Glu Lys Leu Gly Leu Lys  
 305 310 315 320  
 Pro Glu Lys Met Lys Ala Thr Arg Glu Val Leu Ser Glu Tyr Gly Asn  
 325 330 335  
 Met Ser Ser Ala Cys Val Leu Phe Ile Leu Asp Glu Met Arg Lys Lys  
 340 345 350  
 Ser Ala Gln Ala Gly Leu Lys Thr Thr Gly Glu Gly Leu Asp Trp Gly  
 355 360 365  
 Val Leu Phe Gly Phe Gly Pro Gly Leu Thr Ile Glu Thr Val Val Leu  
 370 375 380  
 His Ser Val Ala Ile  
 385

<210> 10

<211> 1242

<212> DNA

<213> Arabidopsis thaliana

<400> 10

ctcaactcta aattcgtccg agacgaagac gaacgcccta aagtcgctta caatgtgttt 60  
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 gagatctgcc gtcagatcgt cgaggcttgt gagaattggg gtatcttcca agtgggttgat 180  
 cacggcgctg atactaactt ggtggcggat atgactcgcc tcgctcgtga cttctttgct 240  
 ttacctccgg aagacaagct ccgtttcgac atgtccggtg gtaaaaaagg tggattcatc 300  
 gtctctagtc acctccaggt aaaagccaca ccacaatctt ctaggttaaa tacgtaatta 360  
 tgttttaatc ttgccgttaa agacataata attatactat aaatacaggg agaggctgtg 420  
 caagattgga gagagattgt aacgtatttc tcgtaccggtg tgagaaacag agactactca 480  
 cggtggccaa ataagcctga aggatgggtg aaagtgcagg aggagtatag tgagaggctt 540  
 atgagtttgg cttgtaagct tcttgaggtt ttgtctgaag ctatgggtct tgagaaagag 600  
 tctcttacca atgcatgcgt cgatatggac caaaagattg ttgttaatta ttacccaaaa 660  
 tgcctcagc ctgactctcac cctcggactc aagcgtcac ctgaccctgg aaccattacc 720  
 ttgctgctac aagaccaagt cggtggatta caagccacac gtgacaatgg caagacctgg 780  
 attacggttc agcctgttga aggagcgttt gtcgtcaatc tcggcgacca cggtcatgtt 840  
 agtactctat ccatttattg gcttttttgt ttctctgttt ttggttttga cttgggtcaac 900  
 cttgatttgt cttgatgaag tttttgagca atgggaggtt caagaatgct gatcatcagg 960  
 ccgtggtgaa ctctaactcg agcagattat ccatagccac gttccagaac cccgcgccgg 1020  
 atgccacagt gtatccactg aaagtaagag aaggagagaa ggcaatattg gaggagccaa 1080

tcacgtttgc cgagatgtat aagagaaaga tgggaagaga tttggagctt gctcgctca 1140  
 agaagctggc taaagaggag cgtgaccaca aagaagttgc caagcctgtc gaccaaattct 1200  
 tcgcttagaa tctctgtgtt cttgcttact tgttgttgcg tt 1242

<210> 11  
 <211> 342  
 <212> PRT  
 <213> Oryza sativa

<400> 11  
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 His Asp Thr Met Pro Gly Lys Tyr Val Arg Pro Glu Ser Gln Arg Pro  
 20 25 30  
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 35 40 45  
 Ala Ser Pro Asp Arg Ala Ala Val Val Ser Ala Val Gly Asp Ala Cys  
 50 55 60  
 Arg Thr His Gly Phe Phe Gln Val Val Asn His Gly Ile Asp Ala Ala  
 65 70 75 80  
 Leu Ile Ala Ser Val Met Glu Val Gly Arg Glu Phe Phe Arg Leu Pro  
 85 90 95  
 Ala Glu Glu Lys Ala Lys Leu Tyr Ser Asp Asp Pro Ala Lys Lys Ile  
 100 105 110  
 Arg Leu Ser Thr Ser Phe Asn Val Arg Lys Glu Thr Val His Asn Trp  
 115 120 125  
 Arg Asp Tyr Leu Arg Leu His Cys Tyr Pro Leu His Gln Phe Val Pro  
 130 135 140  
 Asp Trp Pro Ser Asn Pro Pro Ser Phe Lys Glu Ile Ile Gly Thr Tyr  
 145 150 155 160  
 Cys Thr Glu Val Arg Glu Leu Gly Phe Arg Leu Tyr Glu Ala Ile Ser  
 165 170 175  
 Glu Ser Leu Gly Leu Glu Gly Gly Tyr Met Arg Glu Thr Leu Gly Glu  
 180 185 190  
 Gln Glu Gln His Met Ala Val Asn Tyr Tyr Pro Gln Cys Pro Glu Pro  
 195 200 205  
 Glu Leu Thr Tyr Gly Leu Pro Ala His Thr Asp Pro Asn Ala Leu Thr  
 210 215 220  
 Ile Leu Leu Met Asp Asp Gln Val Ala Gly Leu Gln Val Leu Asn Asp  
 225 230 235 240  
 Gly Lys Trp Ile Ala Val Asn Pro Gln Pro Gly Ala Leu Val Ile Asn

	245		250		255
Ile Gly Asp Gln Leu Gln Ala Leu Ser Asn Gly Lys Tyr Arg Ser Val					
	260		265		270
Trp His Arg Ala Val Val Asn Ser Asp Arg Glu Arg Met Ser Val Ala					
	275		280		285
Ser Phe Leu Cys Pro Cys Asn Ser Val Glu Leu Gly Pro Ala Lys Lys					
	290		295		300
Leu Ile Thr Asp Asp Ser Pro Ala Val Tyr Arg Asn Tyr Thr Tyr Asp					
	305		310		320
Glu Tyr Tyr Lys Lys Phe Trp Ser Arg Asn Leu Asp Gln Glu His Cys					
	325		330		335
Leu Glu Leu Phe Arg Thr					
	340				

<210> 12  
 <211> 815  
 <212> DNA  
 <213> Juglans nigra

<400> 12  
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 cttgccggga tagacgaagt ccatggccgg aggaccgaga tttgccagaa aatcgctcgag 120  
 gcctgtgagg actggggtat tttccaggtg gtcgatcatg gcgtcgatgc cagtctaatac 180  
 tccgacatga cacgtcttgc ccgtgacttc ttcgccatgc ctcccagga aaagcttcgt 240  
 ttcgacatgt ccggcggcaa gaagggcggg ttcattgtct ccagccatct gcaaggagaa 300  
 gcagtgaag attggcgtga aattgtgaca tatctctcat acccaattag gaccagagac 360  
 tattcgaggt ggccggacaa gccagaaggg tggagaaagg tgacggagga gtacagtgaac 420  
 aaattgatgg gactggcatg caaactgttg gaagtgtctat cggaggcgat gggattagag 480  
 aaggaagcat tgaccaaggc ttgcgtggat atggacaaaa aggttgtggg taattactat 540  
 ccaaaatgtc cacagccaga cctcacattg gggctaaagc gccacacaga tcctggcacc 600  
 atcactctgt tggtgcagga ccaggtgggt gggcttcagg ccaccagga tggcggcaag 660  
 acctggatca ctgttcagcc tggtgaagga gctttcgtcg tcaatcttgg agaccatggt 720  
 cttttctga gtaacgggag gttcaagaac gctgatcacc aagcagtggg gaactcaaac 780  
 tacagtcgat tgtccatcgc caccttccaa aacccc 815

<210> 13  
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 <212> DNA  
 <213> Juglans nigra

<220>  
 <221> CDS  
 <222> (1)..(813)

<400> 13  
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 Glu Asp Glu Arg Pro Lys Val Ala Tyr Asn Gln Phe Ser Thr Glu Ile  
 1 5 10 15

ccc atc atc tgc ctt gcc ggg ata gac gaa gtc cat ggc cgg agg acc	96
Pro Ile Ile Ser Leu Ala Gly Ile Asp Glu Val His Gly Arg Arg Thr	
20 25 30	
gag att tgc cag aaa atc gtc gag gcc tgt gag gac tgg ggt att ttc	144
Glu Ile Cys Gln Lys Ile Val Glu Ala Cys Glu Asp Trp Gly Ile Phe	
35 40 45	
cag gtg gtc gat cat ggc gtc gat gcc agt cta atc tcc gac atg aca	192
Gln Val Val Asp His Gly Val Asp Ala Ser Leu Ile Ser Asp Met Thr	
50 55 60	
cgt ctt gcc cgt gac ttc ttc gcc atg cct ccc gag gaa aag ctt cgt	240
Arg Leu Ala Arg Asp Phe Phe Ala Met Pro Pro Glu Glu Lys Leu Arg	
65 70 75 80	
ttc gac atg tcc ggc ggc aag aag ggc ggt ttc att gtc tcc agc cat	288
Phe Asp Met Ser Gly Gly Lys Lys Gly Gly Phe Ile Val Ser Ser His	
85 90 95	
ctg caa gga gaa gca gtg caa gat tgg cgt gaa att gtg aca tat ttc	336
Leu Gln Gly Glu Ala Val Gln Asp Trp Arg Glu Ile Val Thr Tyr Phe	
100 105 110	
tca tac cca att agg acc aga gac tat tgc agg tgg ccg gac aag cca	384
Ser Tyr Pro Ile Arg Thr Arg Asp Tyr Ser Arg Trp Pro Asp Lys Pro	
115 120 125	
gaa ggg tgg aga aag gtg acg gag gag tac agt gac aaa ttg atg gga	432
Glu Gly Trp Arg Lys Val Thr Glu Glu Tyr Ser Asp Lys Leu Met Gly	
130 135 140	
ctg gca tgc aaa ctg ttg gaa gtg cta tgc gag gcg atg gga tta gag	480
Leu Ala Cys Lys Leu Leu Glu Val Leu Ser Glu Ala Met Gly Leu Glu	
145 150 155 160	
aag gaa gca ttg acc aag gct tgc gtg gat atg gac caa aag gtt gtg	528
Lys Glu Ala Leu Thr Lys Ala Cys Val Asp Met Asp Gln Lys Val Val	
165 170 175	
gtt aat tac tat cca aaa tgt cca cag cca gac ctc aca ttg ggg cta	576
Val Asn Tyr Tyr Pro Lys Cys Pro Gln Pro Asp Leu Thr Leu Gly Leu	
180 185 190	
aag cgc cac aca gat cct ggc acc atc act ctg ttg ttg cag gac cag	624
Lys Arg His Thr Asp Pro Gly Thr Ile Thr Leu Leu Leu Gln Asp Gln	
195 200 205	
gtg ggt ggg ctt cag gcc acc agg gat ggc ggc aag acc tgg atc act	672
Val Gly Gly Leu Gln Ala Thr Arg Asp Gly Gly Lys Thr Trp Ile Thr	
210 215 220	
gtt cag cct gtt gaa gga gct ttc gtc gtc aat ctt gga gac cat ggt	720
Val Gln Pro Val Glu Gly Ala Phe Val Val Asn Leu Gly Asp His Gly	
225 230 235 240	
cat ttt ctg agt aac ggg agg ttc aag aac gct gat cac caa gca gtg	768





225		230		235		240									
His	Phe	Leu	Ser	Asn	Gly	Arg	Phe	Lys	Asn	Ala	Asp	His	Gln	Ala	Val
				245					250					255	
Val	Asn	Ser	Asn	Tyr	Ser	Arg	Leu	Ser	Ile	Ala	Thr	Phe	Gln	Asn	
			260					265					270		